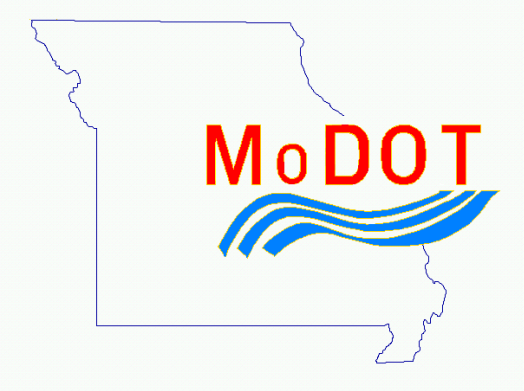


LRFD

Section 3.32

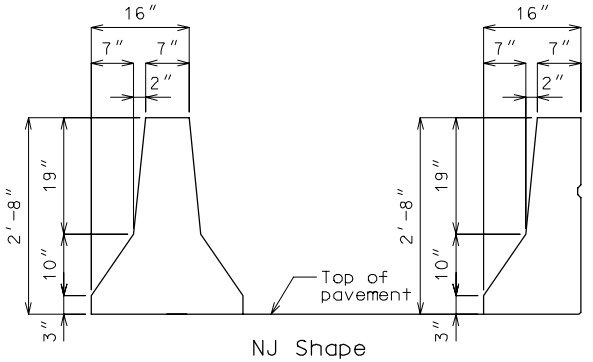
New: April 2005

CLICK HERE TO Index

Index

Safety Barrier Bridge Curb

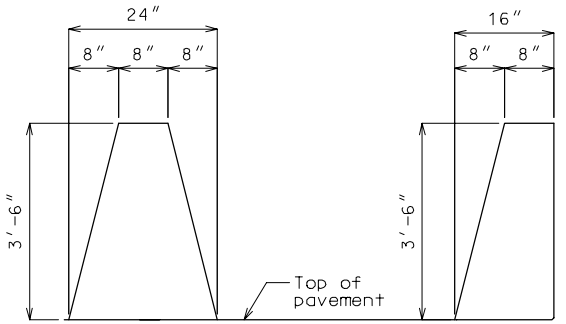
Standard Safety Bridge Barrier Curbs used in Missouri



NJ Shape

Type A
Test Level TL-4

Type B
Test Level TL-4



Type C
Test Level TL-5

Type D
Test Level TL-5

Note:

For Type F (Temprary Barrier Curb), refer to Missouri Standard Plans 617.20.

For Thrie Beam Rails, refer to Missouri LFD Bridge Manual.

See Structural Project Manager before using Type C or D barriers.

3.32.2 Safety Barrier Bridge Curbs

2.1 General Design

LRFD 13.7.1.1

New safety barrier curbs "shall be shown to be structurally and geometrically crashworthy". Therefore, the shape of the safety barrier curb is selected based on crash-tested, or equivalent crash-tested geometry.

FHWA Memo 3 Dated May 30, 1997

The safety barrier curb used on new bridges shall be the 16" New Jersey (MO) safety shape barrier curb which has been crash-tested and FHWA approved as meeting test level TL-4.

LRFD 13.7.2

Test level TL-4 shall be used for safety barrier curb design. TL-4 is defined by AASHTO as being "generally acceptable for the majority of applications on high-speed highways, freeways, expressways, and interstate highways with a mixture of trucks and heavy vehicles".

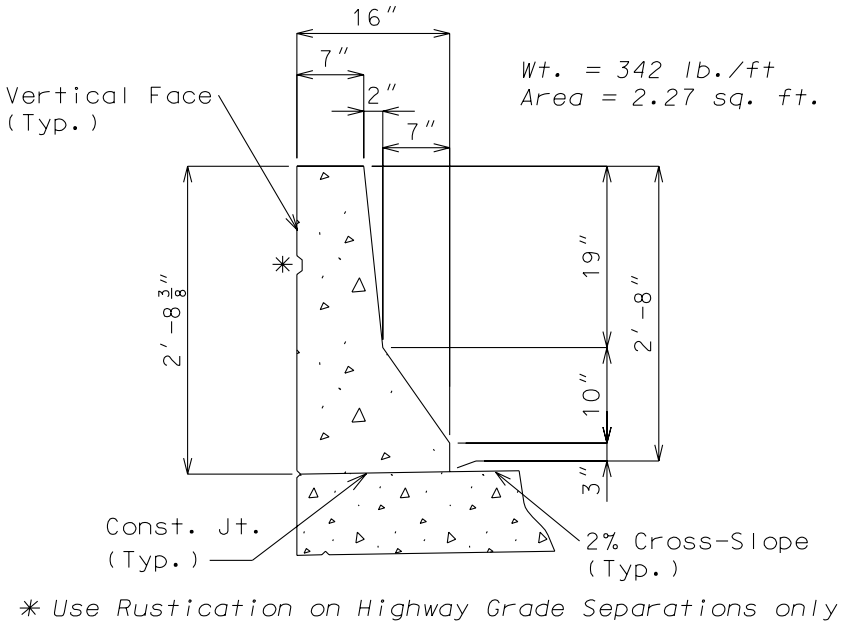


Figure 3.32.2.1 Safety Barrier Bridge Curb Dimensions

Material Properties

Concrete

LRFD Table 3.5.1.1

Unit weight of reinforced concrete, γ_c = 150 lb/ft^3

for modulus of elasticity, γ_c = 145 lb/ft^3

Safety Barrier Curbs

Safety Barrier Curbs shall consist of:

Class B-1 Concrete f'_c =4.0 ksi

n = 8

Median Barrier Curbs

Median Barrier Curbs shall consist of:

Class B-1 Concrete f'_c =4.0 ksi

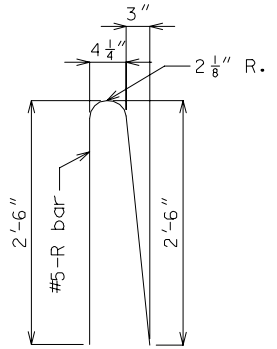
n = 8

Reinforcing steel

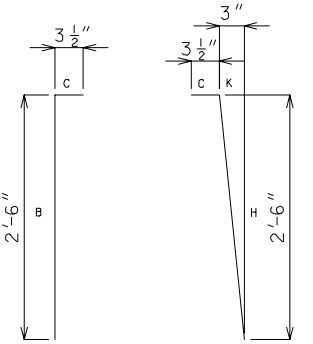
Minimum yield strength, f_y = 60.0 ksi

Steel modulus of elasticity E_s = 29000 ksi

Standard Reinforcement Details **Safety Barrier Bridge Curb**



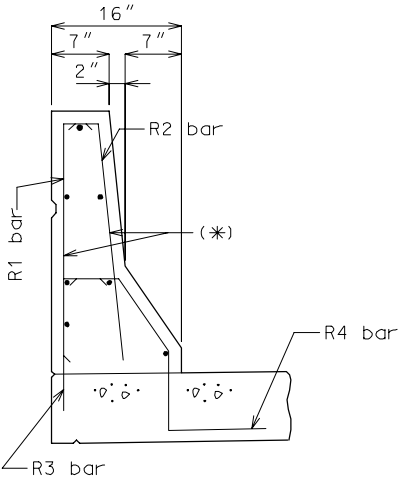
R-BAR
REQUIRED FOR SLIP FORM OPTION



R1 BAR
SHAPE 19

R2 BAR
SHAPE 15

R1 & R2-BARS PERMISSIBLE
ONLY WHEN SLIP FORMING
NOT ALLOWED (✳)

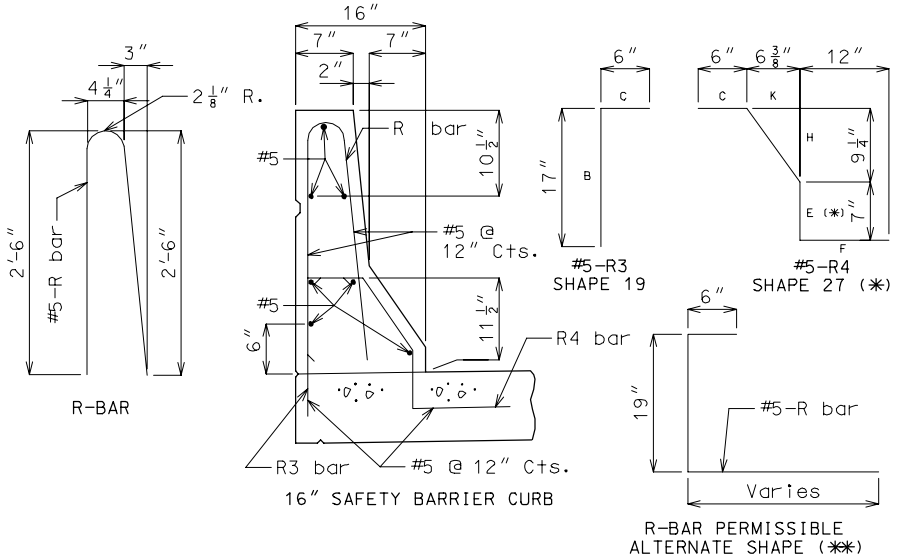


16″ SAFETY BARRIER CURB

(✳) The single R bar adds to the rigidity of the reinforcement during construction and it is believed to help prevent cracking. The single bar also appears to assist maintaining uniform reinforcement cover.

REINFORCEMENT
(NO WEARING SURFACE)

Safety Barrier Bridge Curb



(*) Increase leg for latex or low slump concrete wearing surface.

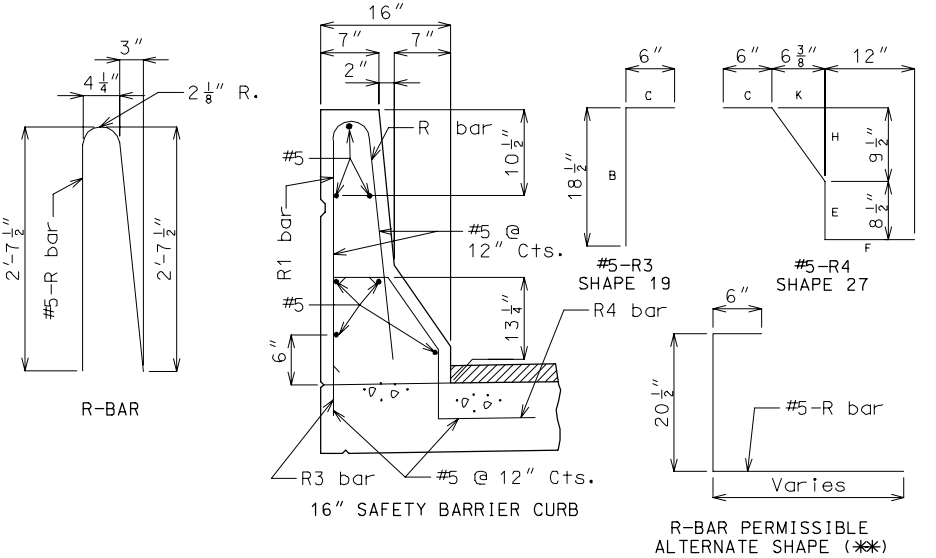
(**) The R3 bar and #5 bottom transverse slab bar in cantilever (P/S panels only) combination may be furnished as one bar as shown, at the contractor's option.

Note: Use same grade reinforcing steel in Barrier Curb as in slab. Splice length for #5 bars in Barrier Curb = 35″.

Dimensions shown are also typical for structures with latex or low slump concrete (except as indicated).

REINFORCEMENT
(1-3/4" WEARING SURFACE)

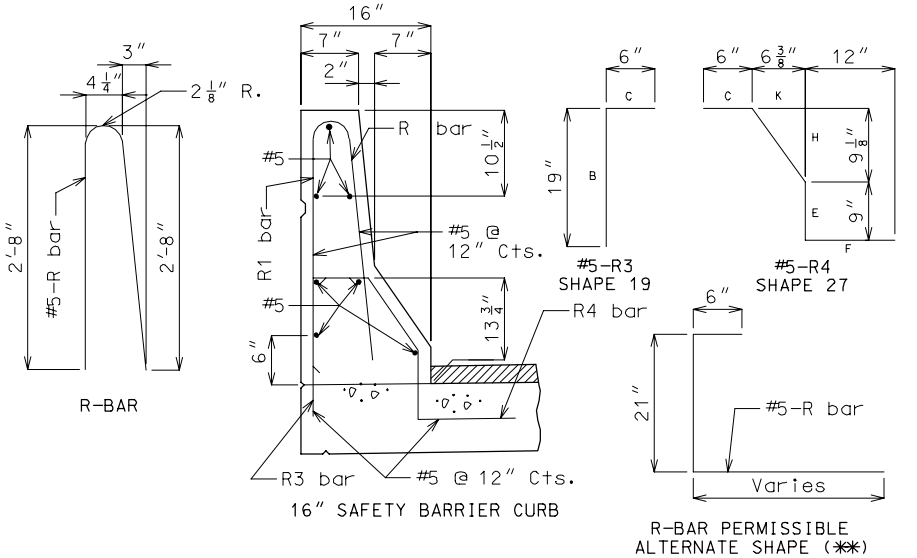
Safety Barrier Bridge Curb



Refer to page 2.2-2 for notes

REINFORCEMENT
(2-1/4" WEARING SURFACE)

Safety Barrier Bridge Curb



Refer to page 2.2-2 for notes

2.3 End Bent Reinforcement Details

Non-Integral End Bent

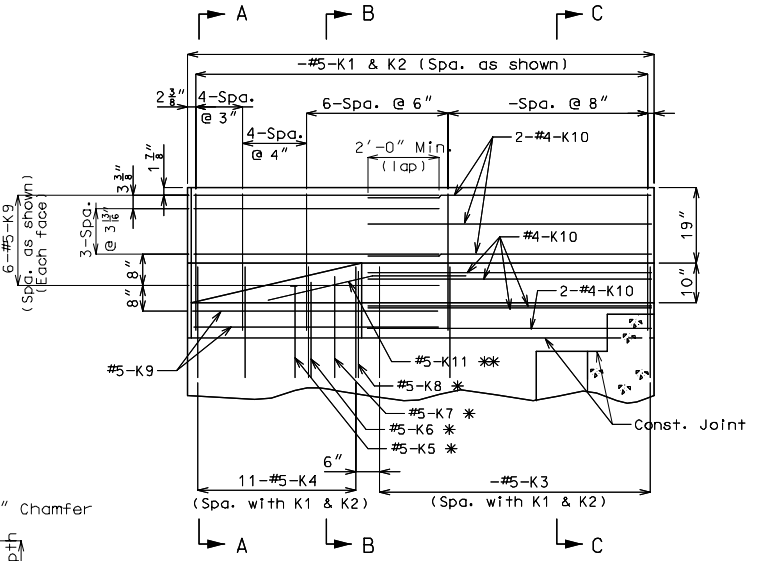
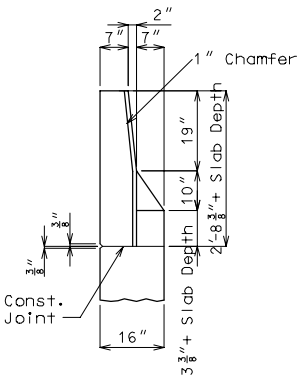


Figure 3.32.2.3 Elevation of Barrier Curb

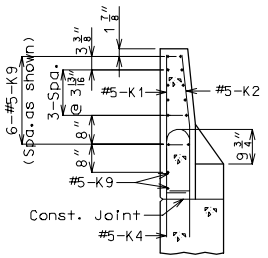


End Elevation

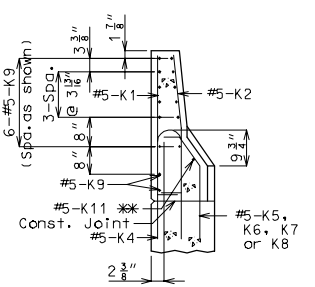
✳ Spaced with #5-K4 bars.

✳✳ Fit bar to follow transition face of curb.

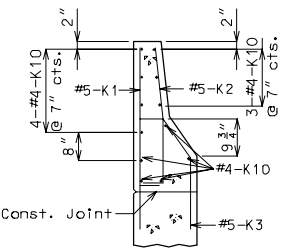
Note: For details of Guard Rail Attachment, See LRFD DG Sec. 3.32.2.6



Section A-A



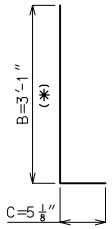
Section B-B



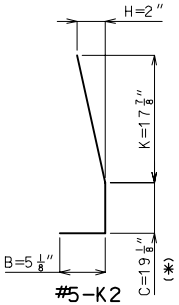
Section C-C

Non-Integral End Bent (Cont.)

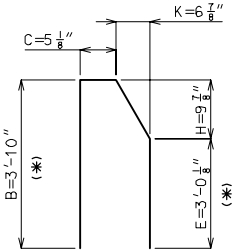
All bars are epoxy coated.
All bars are stirrup bends except for K4, K9, K10 & K11.



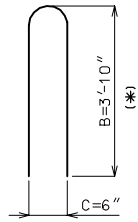
#5-K1
Shape 19



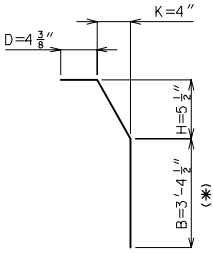
#5-K2
Shape 14



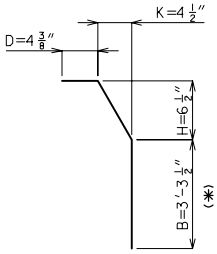
#5-K3
Shape 27



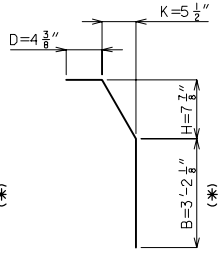
#5-K4
Shape 7



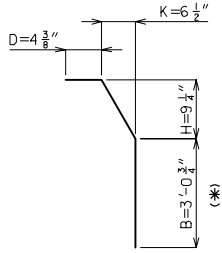
#5-K5
Shape 25



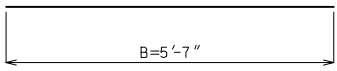
#5-K6
Shape 25



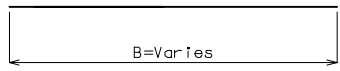
#5-K7
Shape 25



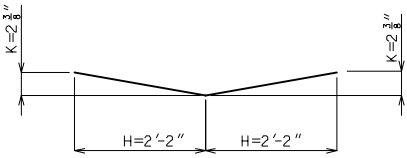
#5-K8
Shape 25



#5-K9
Shape 20



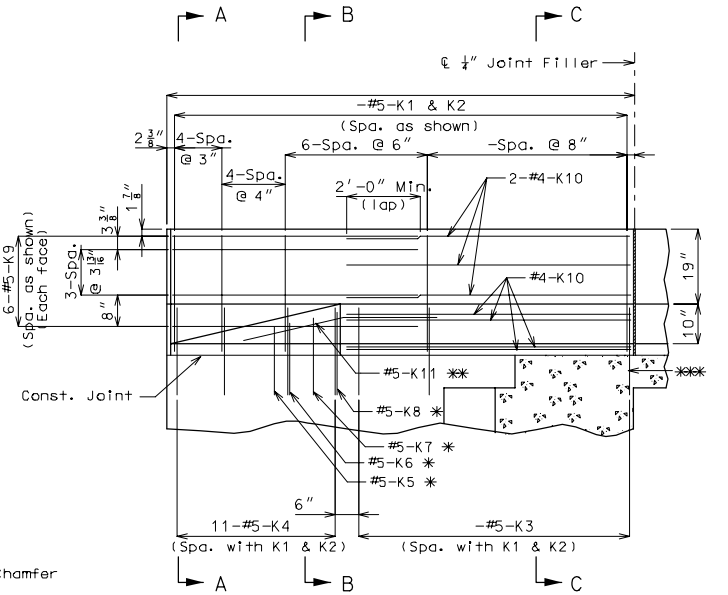
#4-K10
Shape 20

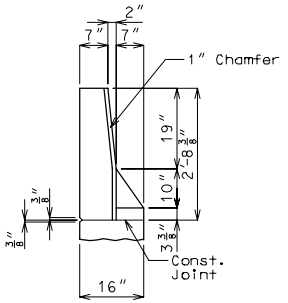


#5-K11
Shape 8

* Increase leg for slab thickness greater than 8 1/2".

Integral End Bent





End Elevation

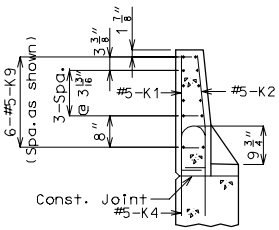
Figure 3.32.2.3.2 Elevation of Barrier Curb

* Spaced with #5-K4 bars.

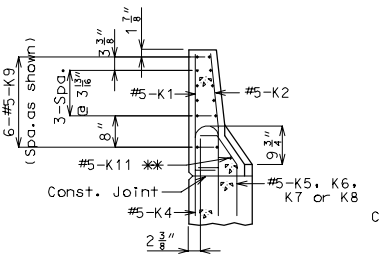
** Fit bar to follow transition face of curb.

*** On skewed structures, if end K3 bar does not meet the Min. 1-1/2" clearance from front face of diaphragm, a K12 bar may be substituted.

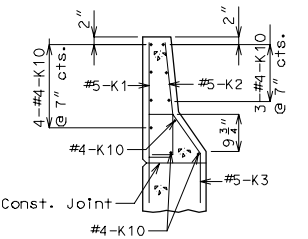
Note: For details of Guard Rail Attachment, See LRFD DG Sec. 3.32.2.6



Section A-A



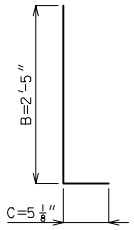
Section B-B



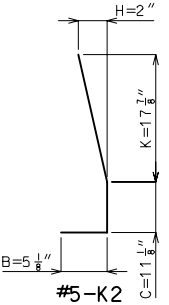
Section C-C

Integral End Bent (Cont.)

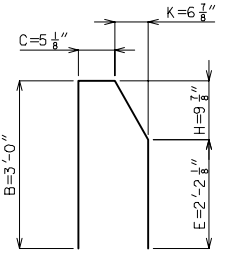
All bars are epoxy coated.
All bars are stirrup bends except for K4, K9, K10 & K11.



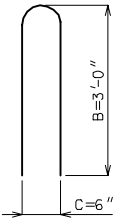
#5-K1
Shape 19



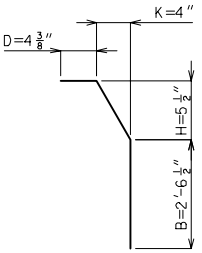
#5-K2
Shape 14



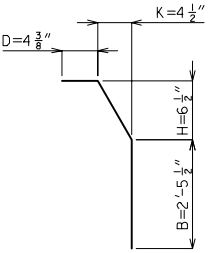
#5-K3
Shape 27



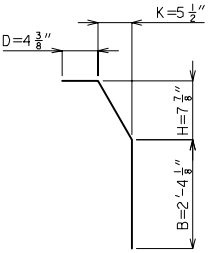
#5-K4
Shape 7



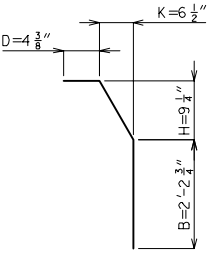
#5-K5
Shape 25



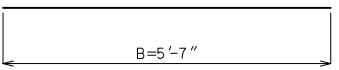
#5-K6
Shape 25



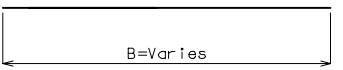
#5-K7
Shape 25



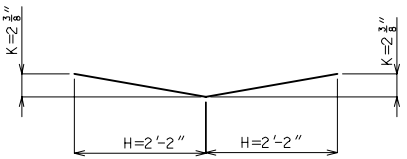
#5-K8
Shape 25



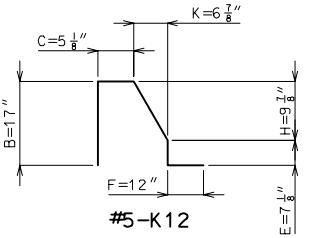
#5-K9
Shape 20



#4-K10
Shape 20



#5-K11
Shape 8



#5-K12
Shape 27

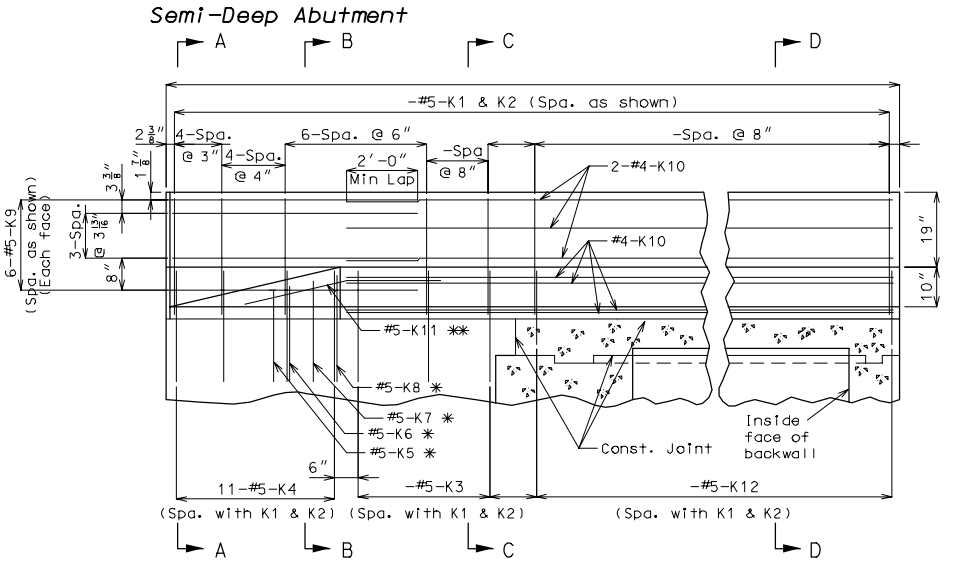
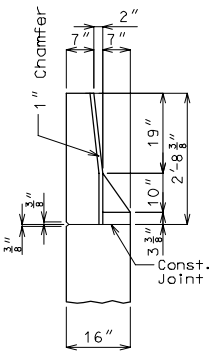


Figure 3.32.2.3.3 Elevation of Barrier Curb

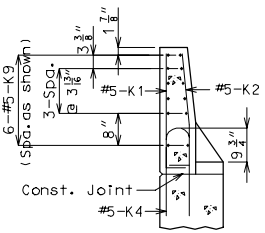
✳ Spaced with #5-K4 bars.

✳✳ Fit bar to follow transition face of curb.

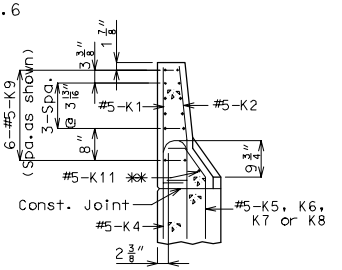
Note: For details of Guard Rail Attachment, See LRFD DG Sec. 3.32.2.6



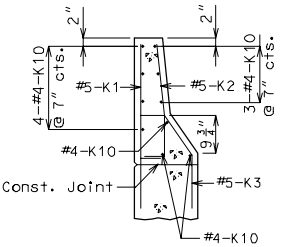
End Elevation



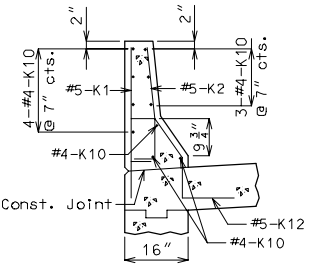
Section A-A



Section B-B



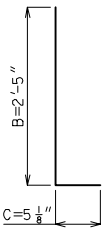
Section C-C



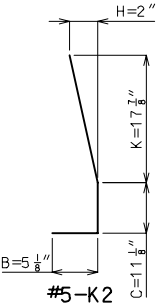
Section D-D

Semi-Deep Abutment (Cont.)

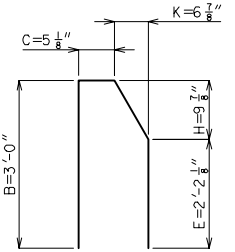
All bars are epoxy coated.
All bars are stirrup bends except for K4, K9, K10 & K11.



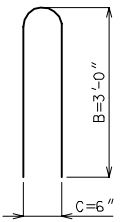
#5-K1
Shape 19



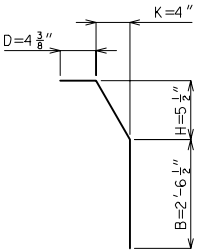
#5-K2
Shape 14



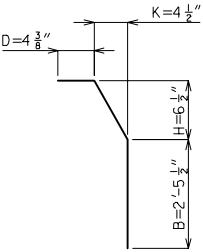
#5-K3
Shape 27



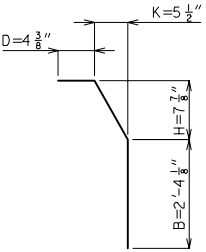
#5-K4
Shape 7



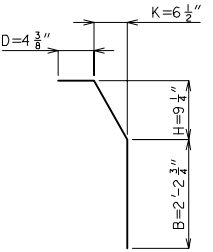
#5-K5
Shape 25



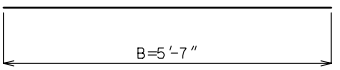
#5-K6
Shape 25



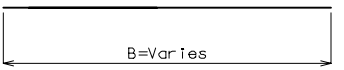
#5-K7
Shape 25



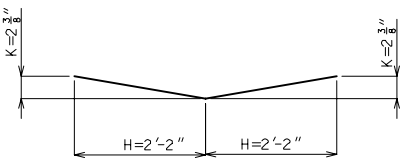
#5-K8
Shape 25



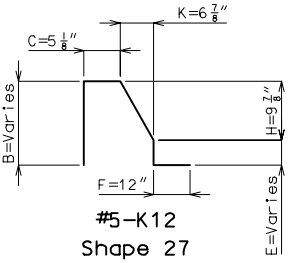
#5-K9
Shape 20



#4-K10
Shape 20



#5-K11
Shape 8



#5-K12
Shape 27

Continuous Concrete Slab

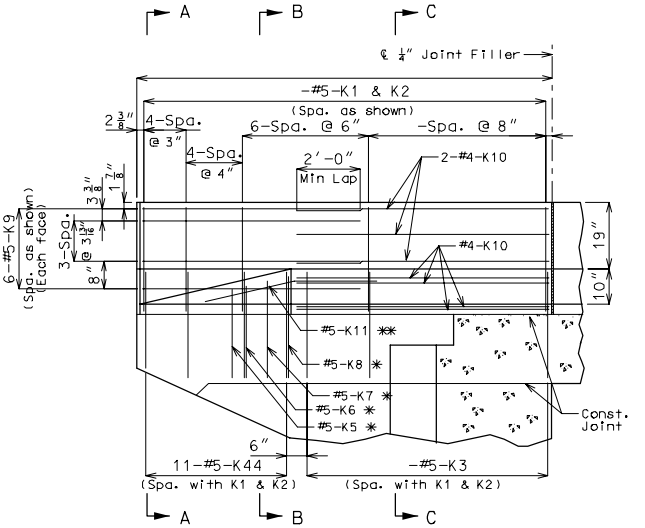
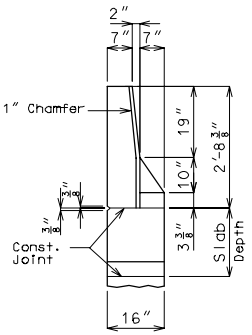


Figure 3.32.2.3.4 Elevation of Barrier Curb

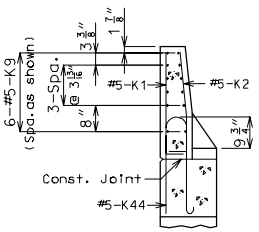


End Elevation

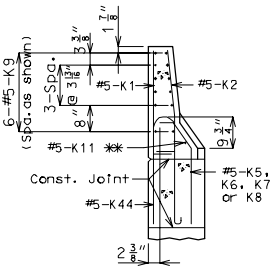
* Spaced with #5-K44 bars.

** Fit bar to follow transition face of curb.

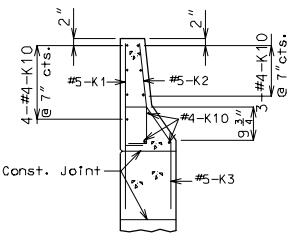
Note: For details of Guard Rail Attachment, See LRFD DG Sec. 3.32.2.6



Section A-A



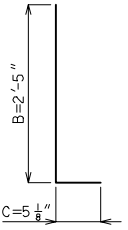
Section B-B



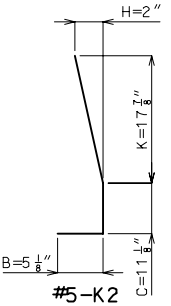
Section C-C

Continuous Concrete Slab (Cont.)

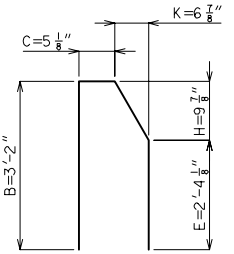
All bars are epoxy coated.
All bars are stirrup bends except for K44, K9, K10 & K11.



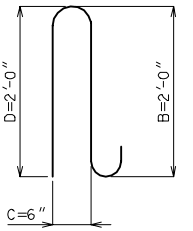
#5-K1
Shape 19



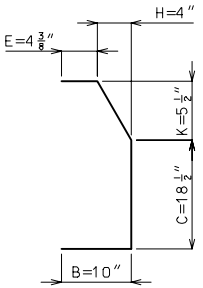
#5-K2
Shape 14



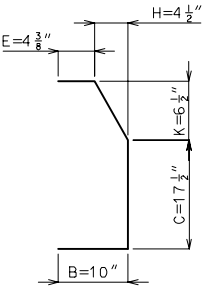
#5-K3
Shape 27



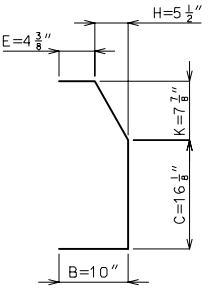
#5-K44
Shape 12



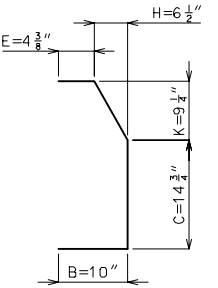
#5-K5
Shape 27



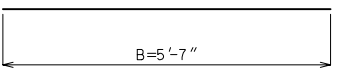
#5-K6
Shape 27



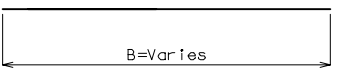
#5-K7
Shape 27



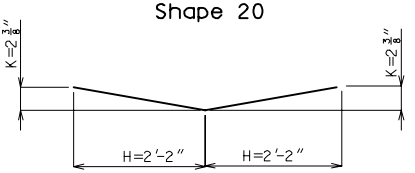
#5-K8
Shape 27



#5-K9
Shape 20

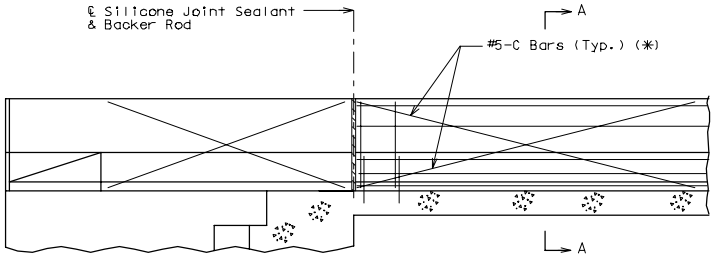


#4-K10
Shape 20

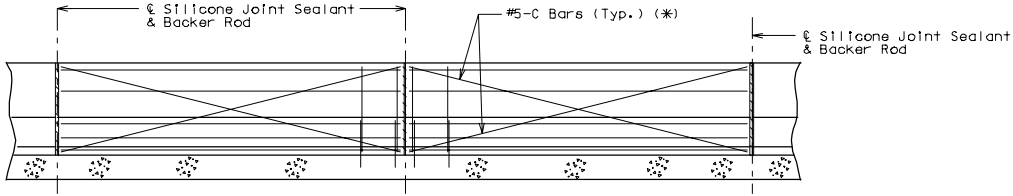


#5-K11
Shape 8

Slip-Form Reinforcement Option



Section at End Bent (Optional Slip-Form Barrier)



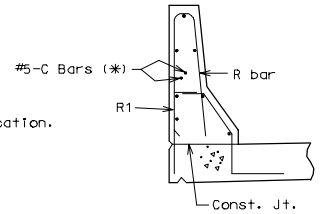
Section Near Joints (Optional Slip-Form Barrier)

NOTE TO DETAILER:

Optional Slip-Form Safety Barrier Curb details shall be placed on all jobs (except Prestressed Double-Tee Structures) where applicable.

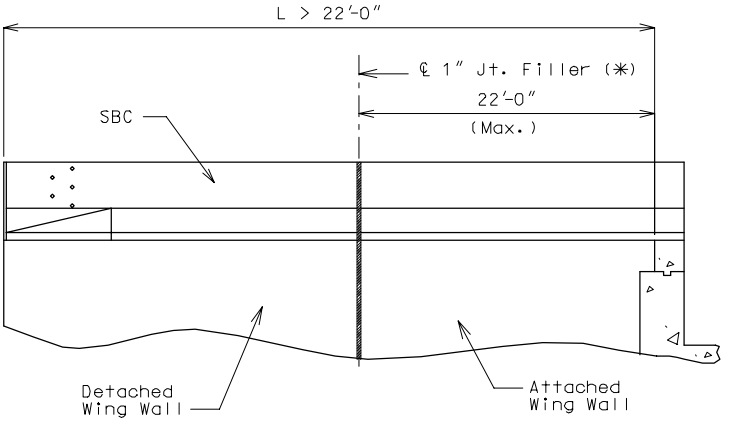
Add #5 cross bracing bars for Slip-Form option. Base the length of these bars on the shortest distance between joints throughout the structure. Show the C-Bars in the Bar List and note that these bars are for the Slip-Form option only.

(*) Each Side of Joint Location.

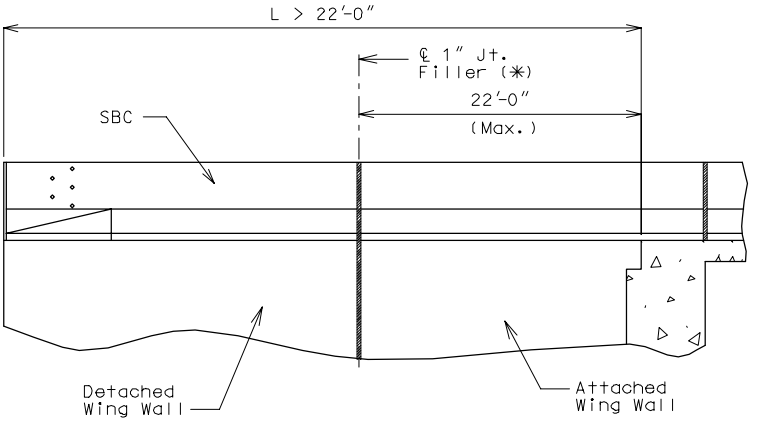


Section A-A

SBC FOR WING WITH DETACHED WING WALL



SBC ON NON-INTEGRAL END BENT (*)

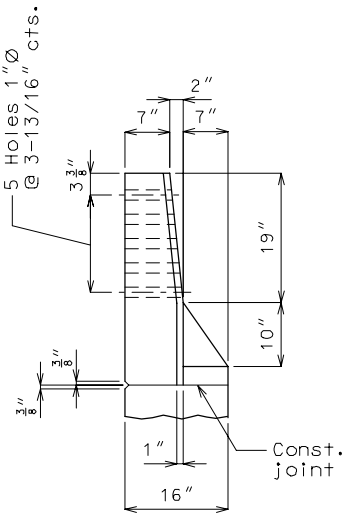


SBC ON INTEGRAL END BENT (*)

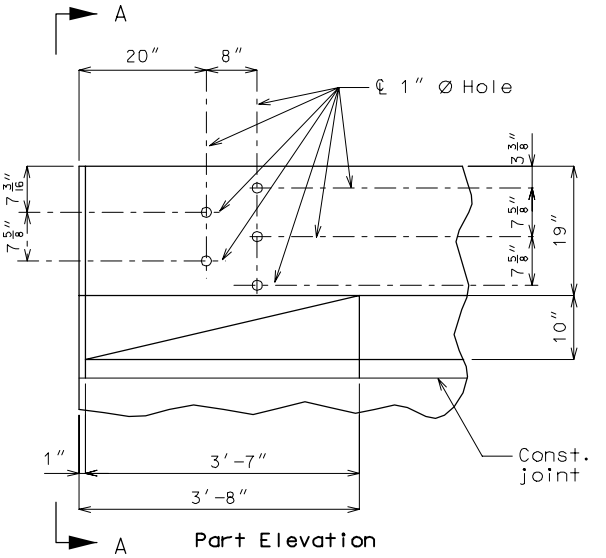
(*) Detached Wing Wall shown is for illustration purpose only.

If the detached wing wall has more than one section, see the Structural Project Manager for possible additional joints in the safety barrier curb (between sections).

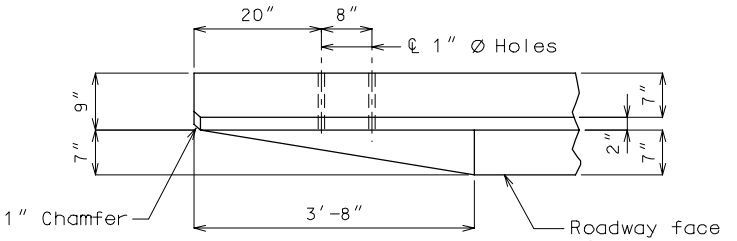
Guard Rail Attachment Detail



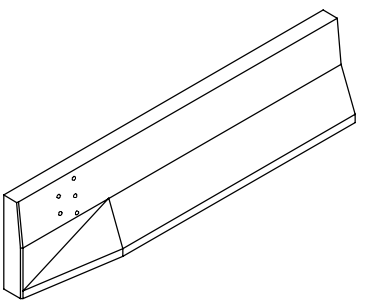
Part Elevation A-A



Part Elevation

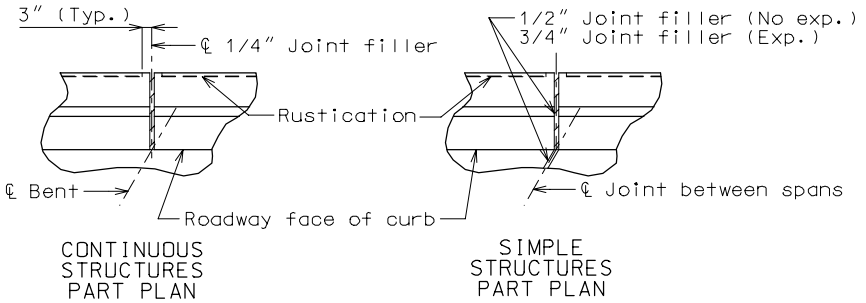


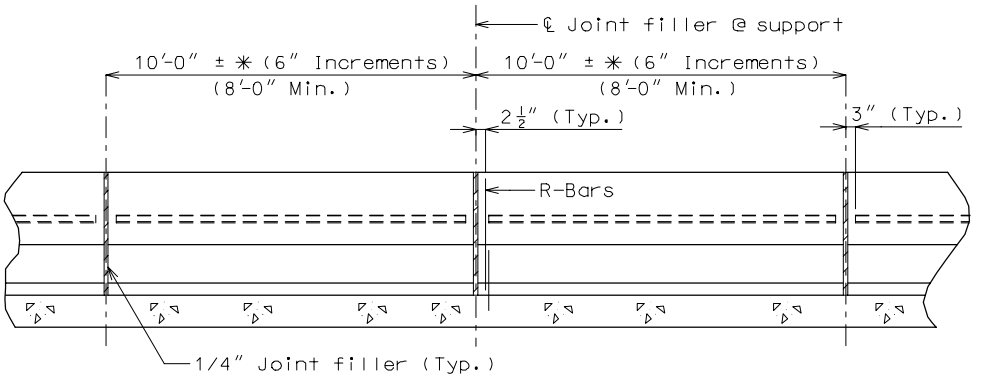
Part Plan



Auxiliary View

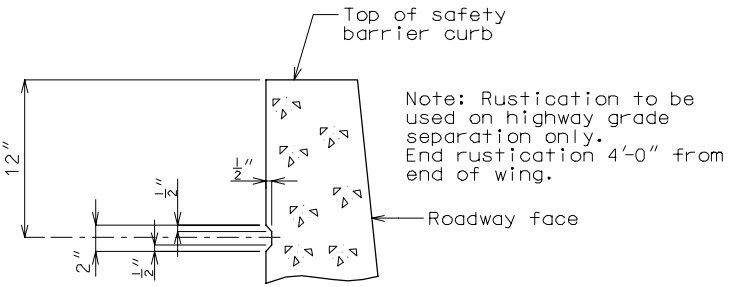
Joint and Rustication Details





ALL TYPES OF CONTINUOUS STRUCTURE ELEVATION

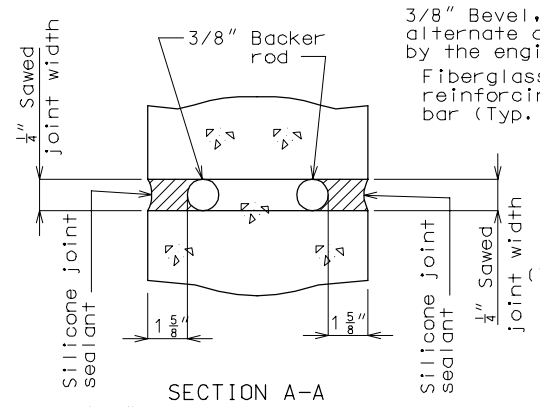
✳ No more than ¼ span on short spans (40'-0" or less). Joints are located to prevent cracking in negative moment areas. Spans greater than 125' requires two (8'-0" Min.) joints on each side of support.



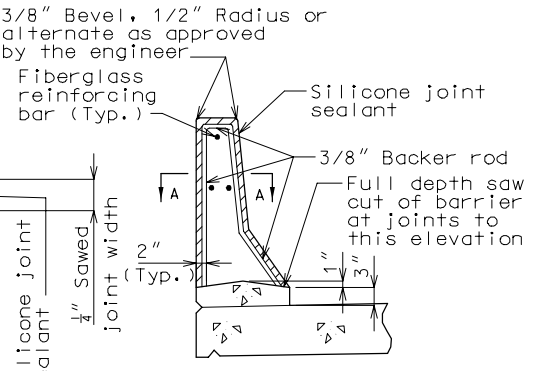
PART SECTION SHOWING RUSTICATION DETAILS

JOINT AND RUSTICATION DETAILS (CONT.)
OPTIONAL SLIP FORM SAFETY BARRIER CURB

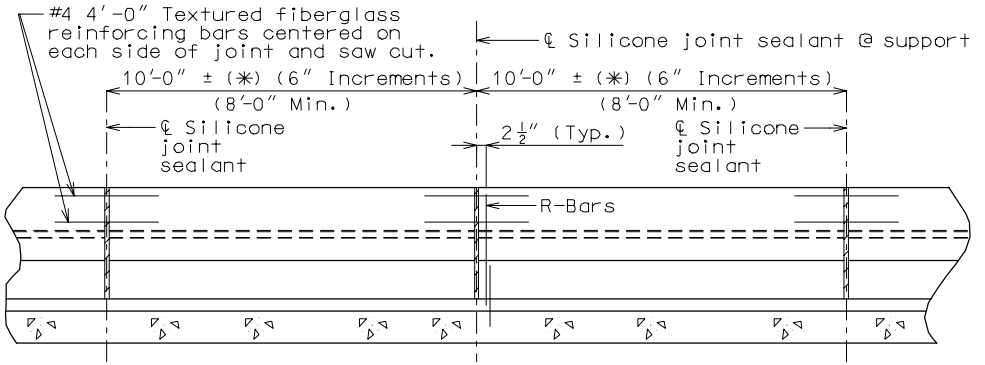
Note: All joints and gaps required for expansion need to be provided in the barrier curb.



SECTION A-A

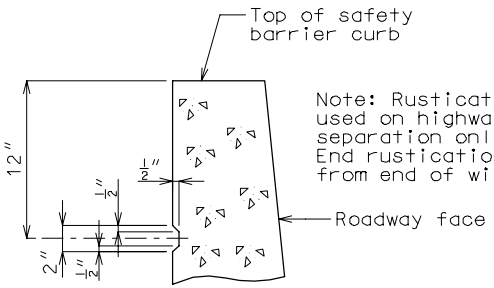


SECTION THRU JOINT



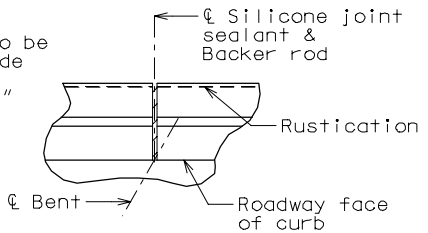
ELEVATION
ALL TYPES OF CONTINUOUS STRUCTURE

(*) No more than 1/4 span on short spans (40'-0" or less). Joints are located to prevent cracking in negative moment areas. Spans greater than 125' requires two 8'-0" (Min.) joints on each side of support.



Note: Rustication to be used on highway grade separation only. End rustication 4'-0" from end of wing.

PART SECTION SHOWING
RUSTICATION DETAILS



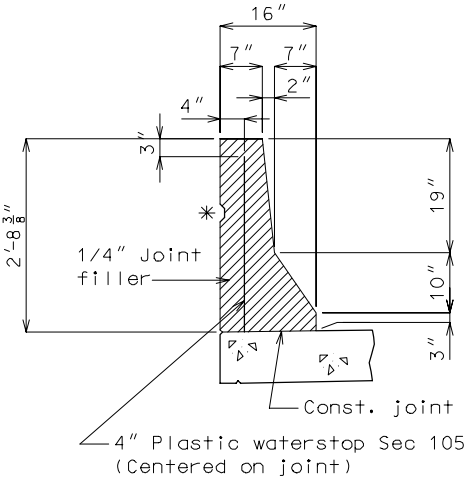
PART PLAN
CONTINUOUS
STRUCTURES

Plastic Waterstop on Bridge

To eliminate water seepage problems, use a plastic waterstop, as specified, and in accordance with details shown below.

Use a plastic waterstop at all safety barrier curb joints on grade separations, except over railroads and county roads.

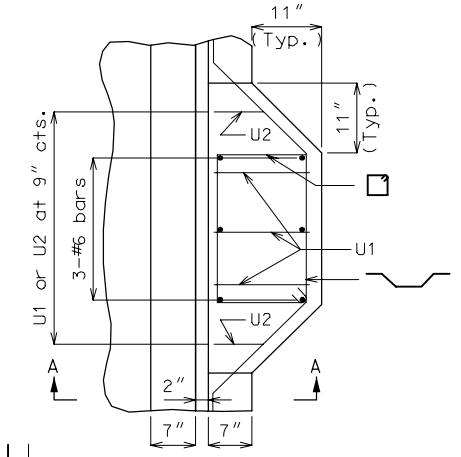
Use a plastic waterstop on lower safety barrier curb joint only, for structures with superelevation on grade separations.



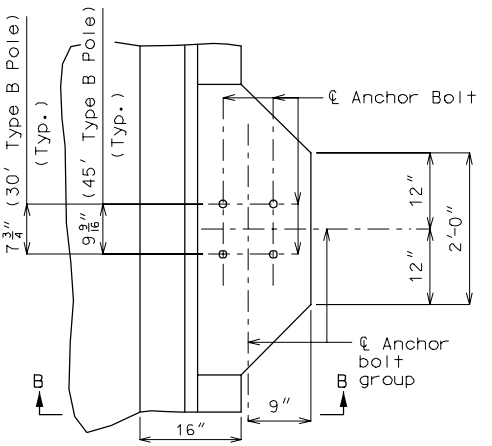
✳ Rustication to be used on highway grade separations only.

Joint Filled Detail

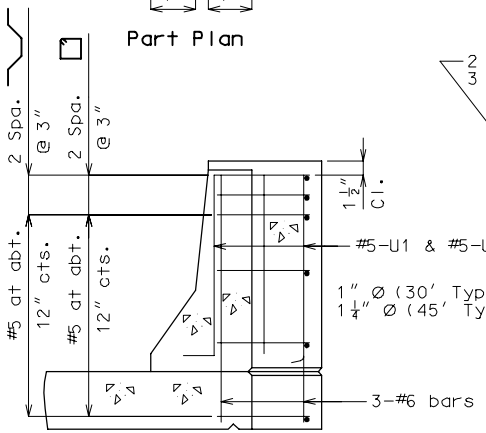
Details of Mounting Light Poles



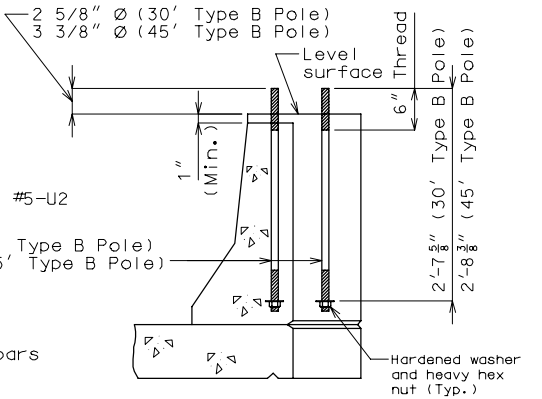
Part Plan



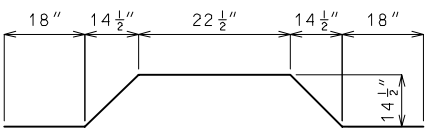
Part Plan

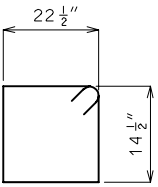


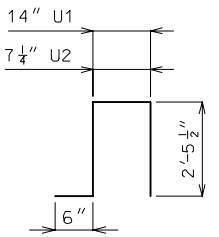
Section A-A



Section B-B







Anchor bolts and nuts shall be AASHTO M 314-90 Grade 55. Anchor bolts, nuts and washers shall be fully galvanized.

Note to Detailer:
Extend slab transverse steel to edge of slab in blister region.

Note: Conduit not shown for clarity.

Superelevation Details

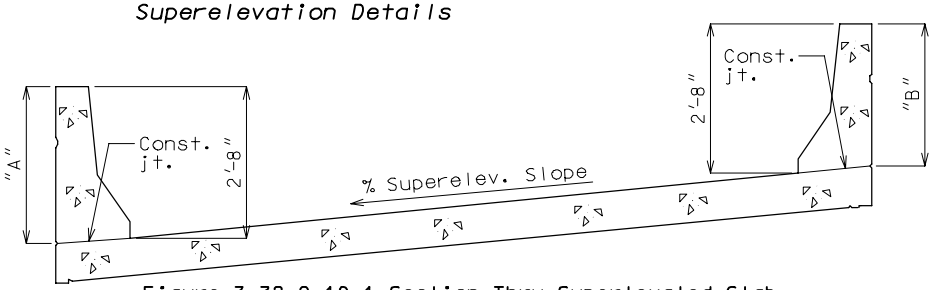


Figure 3.32.2.10.1 Section Thru Superlevated Slab

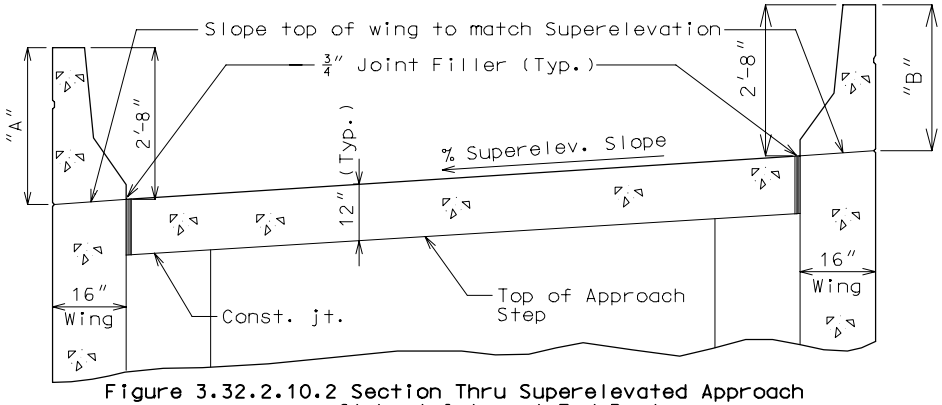


Figure 3.32.2.10.2 Section Thru Superelevated Approach Slab at Integral End Bent

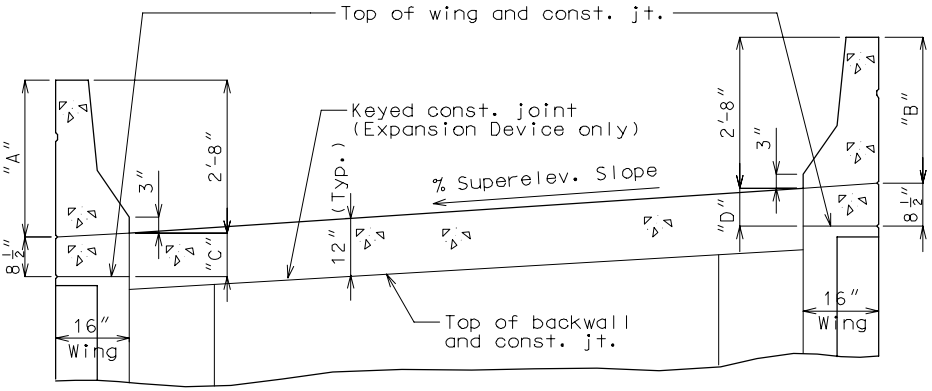
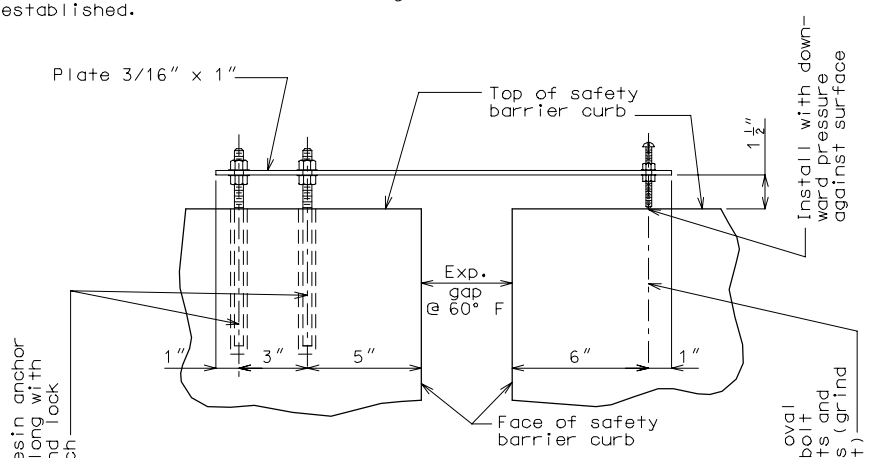


Figure 3.32.2.10.3 Section Thru Superelevated Approach Slab at Non-Integral End Bent

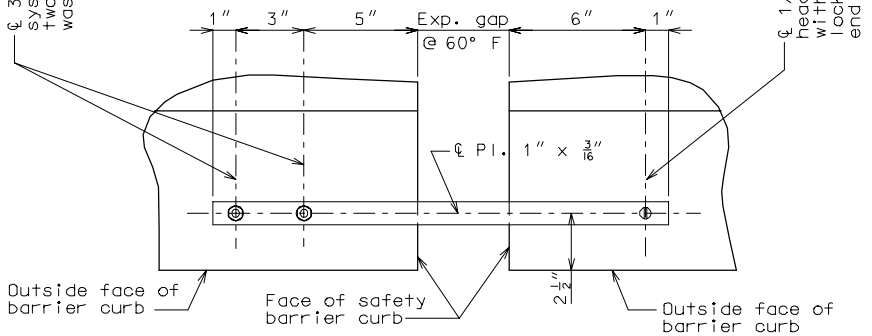
"A" = 2'-8" + (Superelev. Slope x 16")
"B" = 2'-8" - (Superelev. Slope x 16")
"C" = 8 1/2" + (Superelev. Slope x 16")
"D" = 8 1/2" - (Superelev. Slope x 16")

Expansion Device Movement Gauge Details

All expansion joints shall be equipped with a movement gauge so an historical visual record showing total movement can be established.



Elevation View of Movement Gauge



Plan View of Movement Gauge

Add following notes to plans.

Notes:
A movement gauge shall be provided on one side of bridge at all safety barrier curb expansion joints.

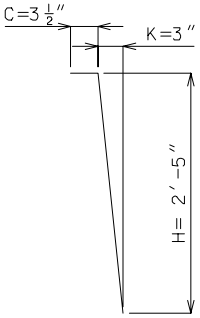
All steel shall be galvanized.

Cost of movement gauge, complete-in-place, shall be included in the contract unit price bid for Safety Barrier Curb.

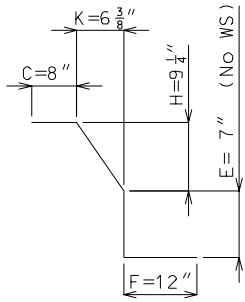
Double-Faced Median Barrier Curb Reinforcement

Note: Use same grade reinforcing steel in barrier curb as in slab.
Splice length for #5-R bars in barrier curb = 35″.
Do not use this barrier curb over precast prestressed panels.

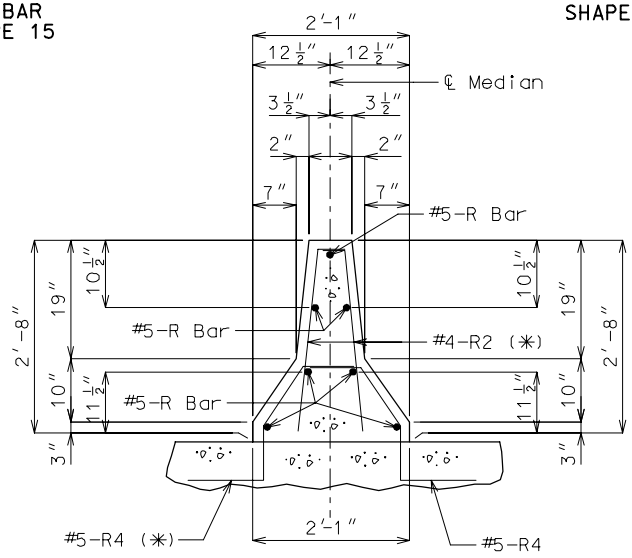
Note to detailer: Provide slip-form option for double faced median safety barrier curb. For slip-form option additional #5 cross bracing bars shall be placed on both sides of all joints and R2 bars shall be one bar (Refer to LRFD DG Sec. 3.32.2.4-1).



R2 BAR
SHAPE 15

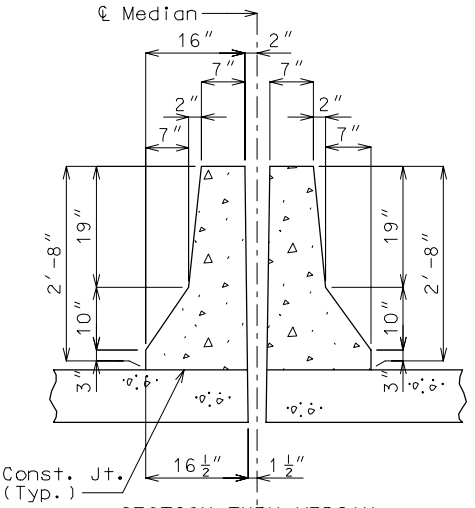


R4 BAR
SHAPE 27



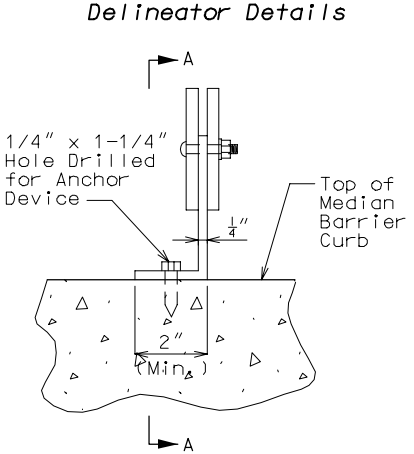
SECTION THRU DOUBLE FACED MEDIAN BARRIER CURB

Twin Bridge Median Barrier Curb Details

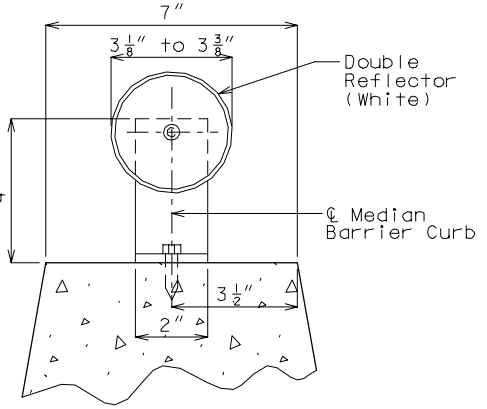


SECTION THRU MEDIAN
WITH OPEN JOINT

Delineator Details



PART ELEVATION



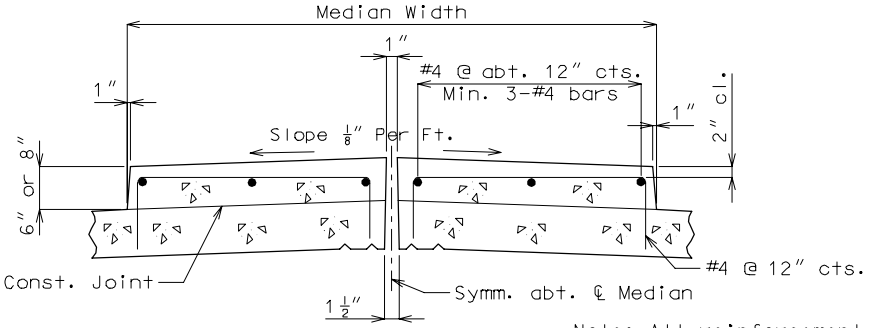
SECTION A-A

Notes: All materials for supporting delineators shall be aluminum except anchor devices. If anchor device material is other than aluminum, insulation shall be provided between metals to prevent passage of electric current. Other attaching methods may be used if approved by the Structural Project Manager. No direct payment is made for delineators.

Delineator Spacing:

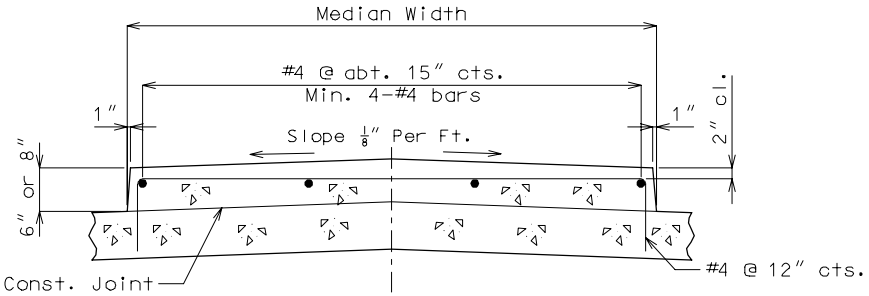
0° to 2°45′ Curve = 100′-0″ Spacing
3° to 6° Curve = 60′-0″ Spacing

Concrete Median Curbs



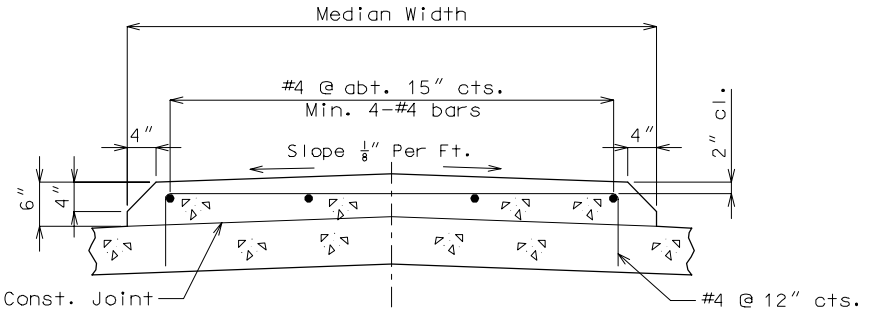
OPEN JOINT
(TWIN BRIDGES TYP.)

Note: All reinforcement shown shall be epoxy coated.



BARRIER CLASS (NO JOINT)

(Similar to Design Division's Type Curb A)

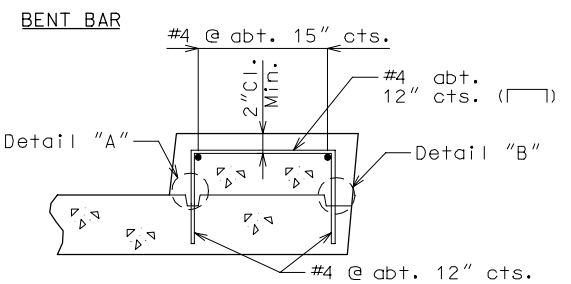


MOUNTABLE CLASS

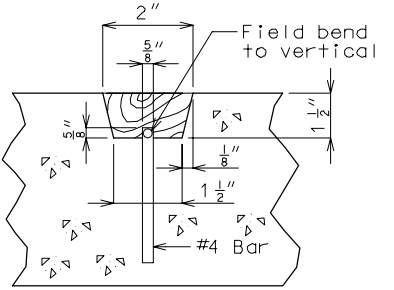
Details shown are very general. Consult Design Layout for specific details for each individual structure.

Concrete Median Curbs (Permissable Alternates)

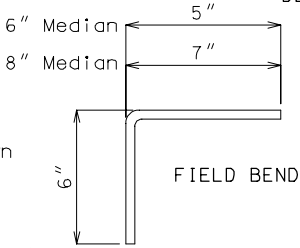
BENT BAR



OPEN JOINT
(TWIN BRIDGES TYP.)

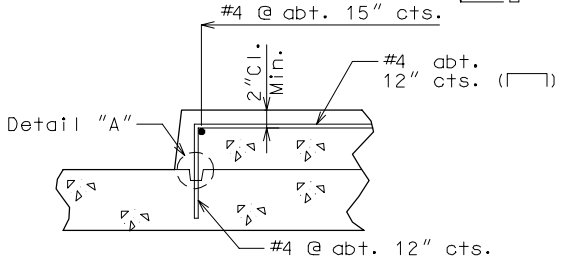


DETAIL "A"

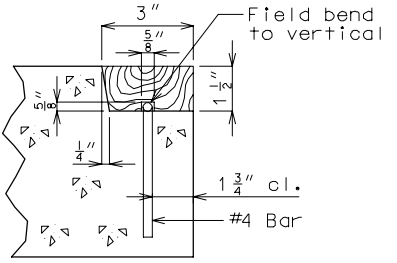


FIELD BEND BAR

Note: All reinforcement shown shall be epoxy coated.



BARRIER CLASS (NO JOINT)
(Mountable Class similar but not shown)

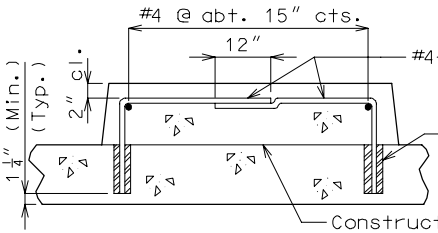


DETAIL "B"

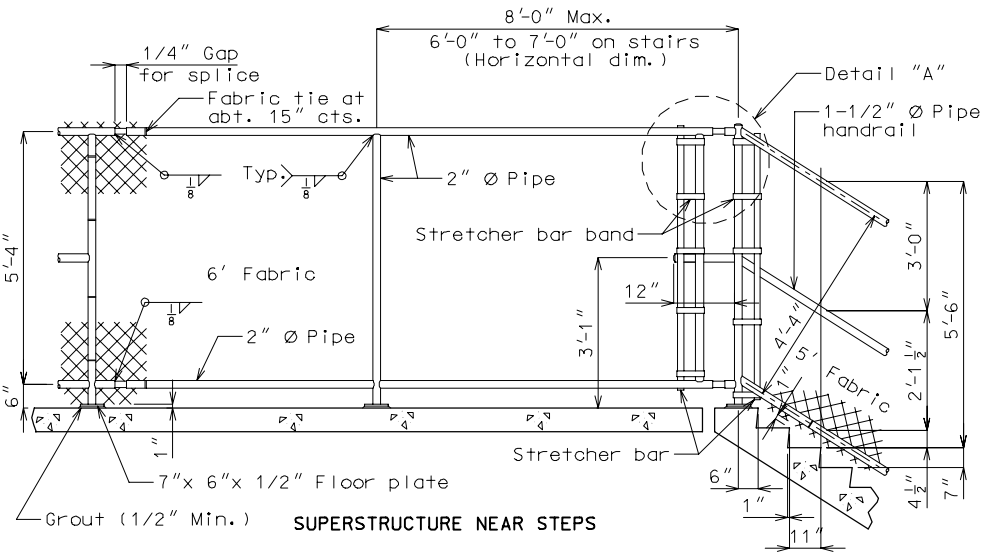
Add note to plans:

No additional payment will be allowed for the usage of either alternate anchoring systems.

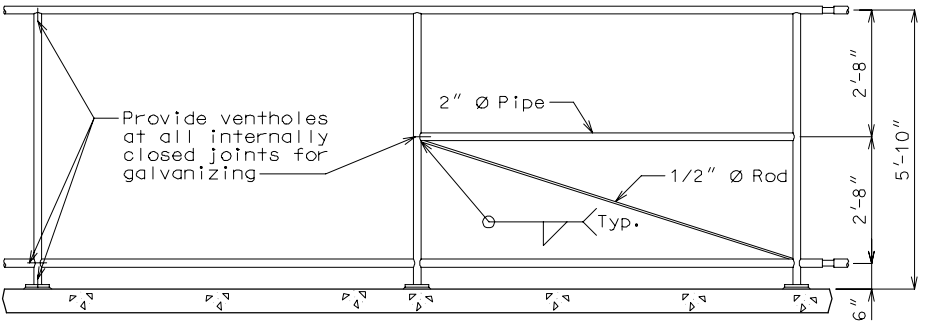
RESIN ANCHOR



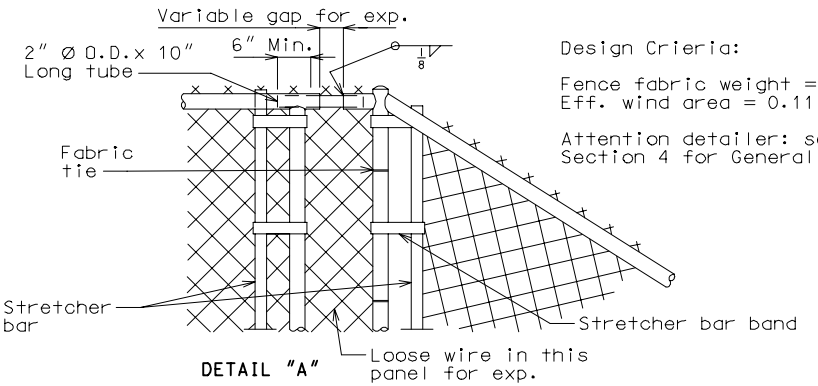
PEDESTRIAN OVERPASS (GALVANIZED STEEL) **Chain Link Fence**



SUPERSTRUCTURE NEAR STEPS



SUPERSTRUCTURE AT OR NEAR END PANEL



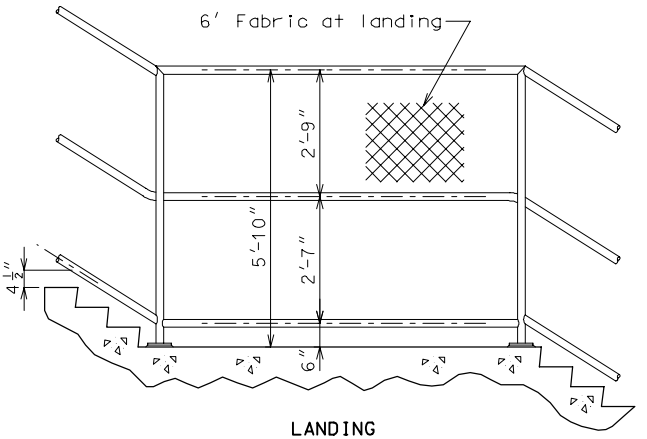
DETAIL "A"

Design Crieria:

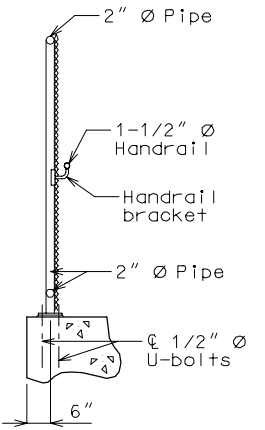
Fence fabric weight = 10#/lin.ft.
Eff. wind area = 0.11 area/sq.ft.

Attention detailer: see
Section 4 for General Notes.

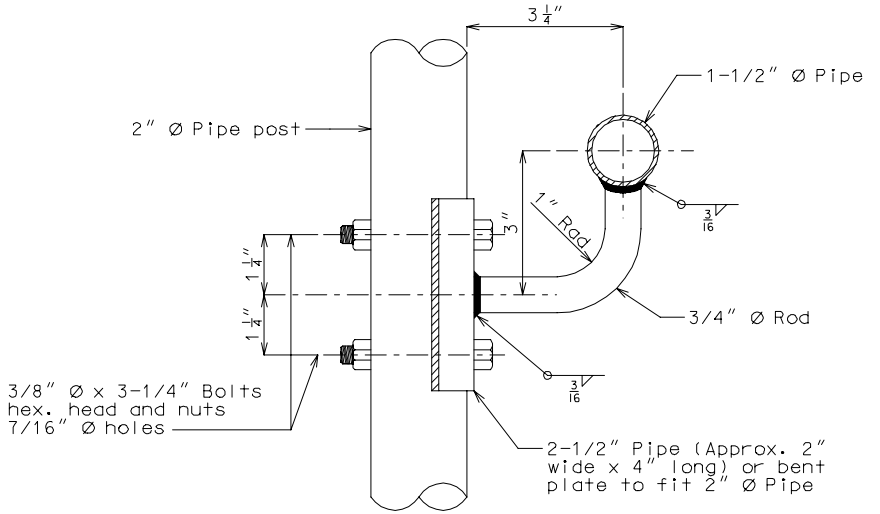
PEDESTRIAN OVERPASS (GALVANIZED STEEL) (CONT.) **Chain Link Fence**



LANDING

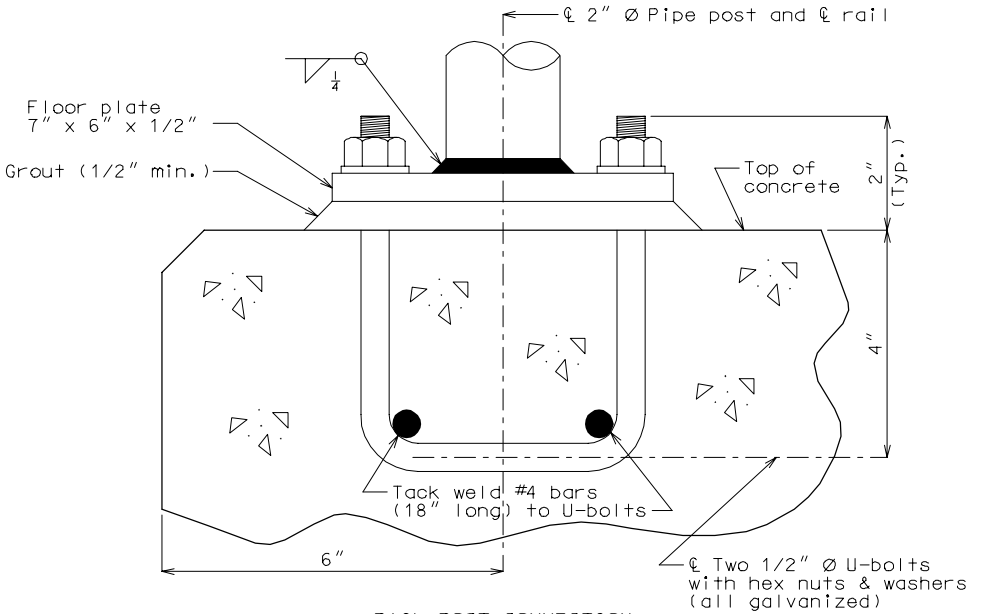


SECTION THRU FENCE

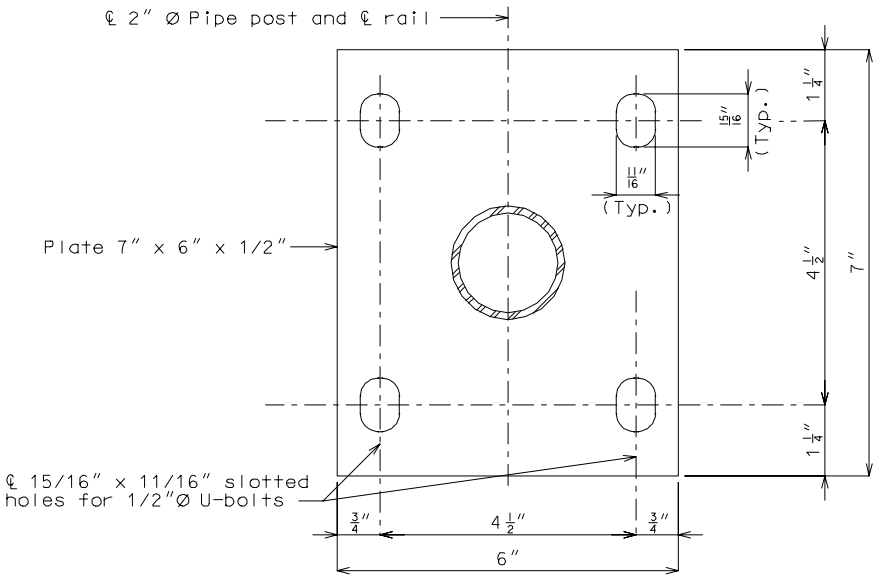


DETAILS OF HANDRAIL BRACKET

PEDESTRIAN OVERPASS (CONT.)
FLOOR PLATE (GALVANIZED STEEL)

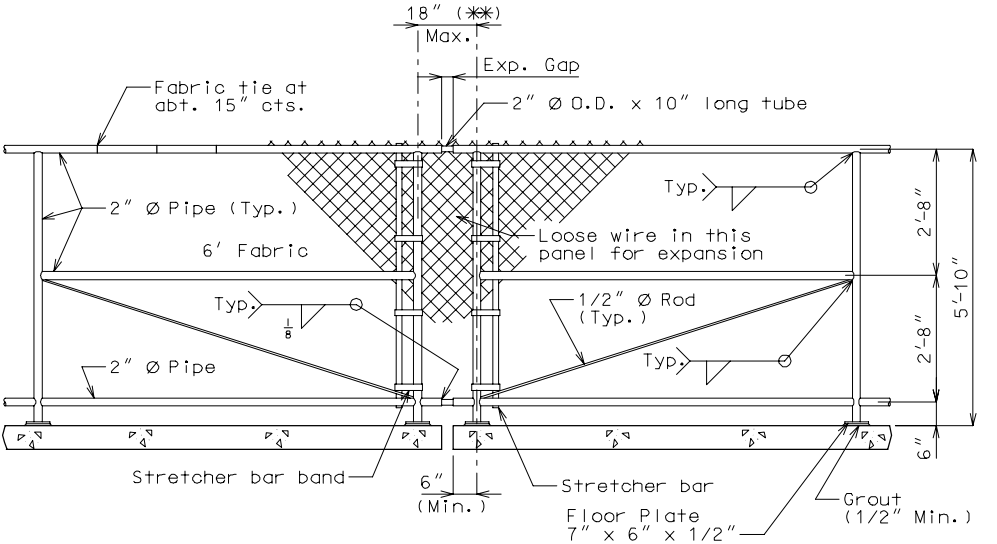


RAIL POST CONNECTION
(TYPICAL)



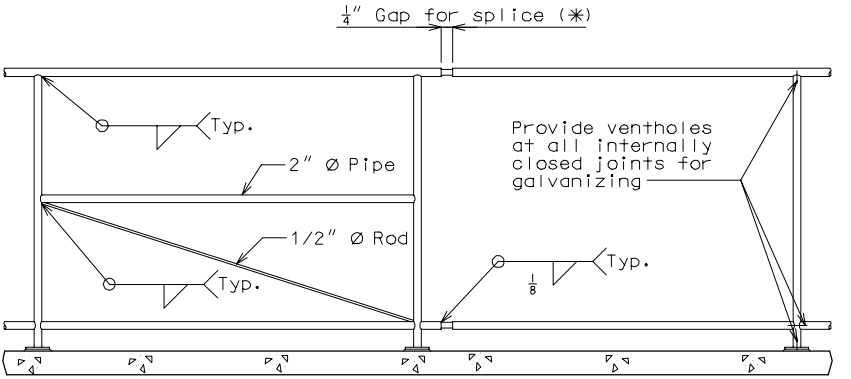
PLAN OF FLOOR PLATE

PEDESTRIAN OVERPASS (GALVANIZED STEEL) (CONT.) **Chain Link Fence**



DETAILS AT EXPANSION DEVICE GAP

(✳✳) May conflict with any proposed expansion device sidewalk, consult Structural Project Manager.



TYPICAL SECTION NEAR SPLICE GAP

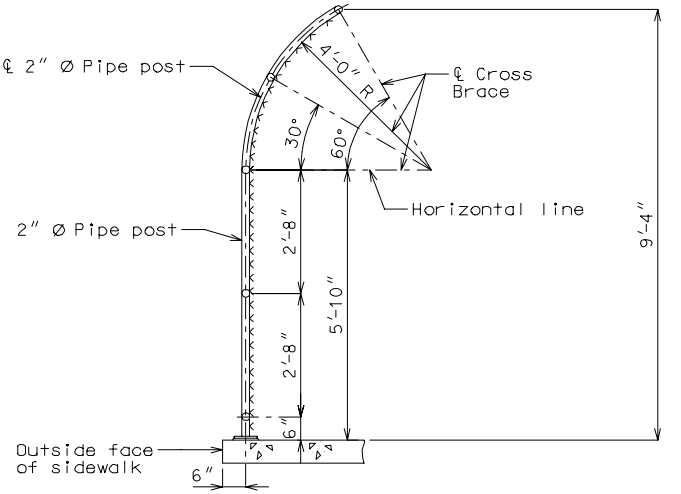
Note: 8'-0" max. post spacing for superstructure.

(✳) Locate at about 30'-0" centers with at least one splice gap between pull posts.

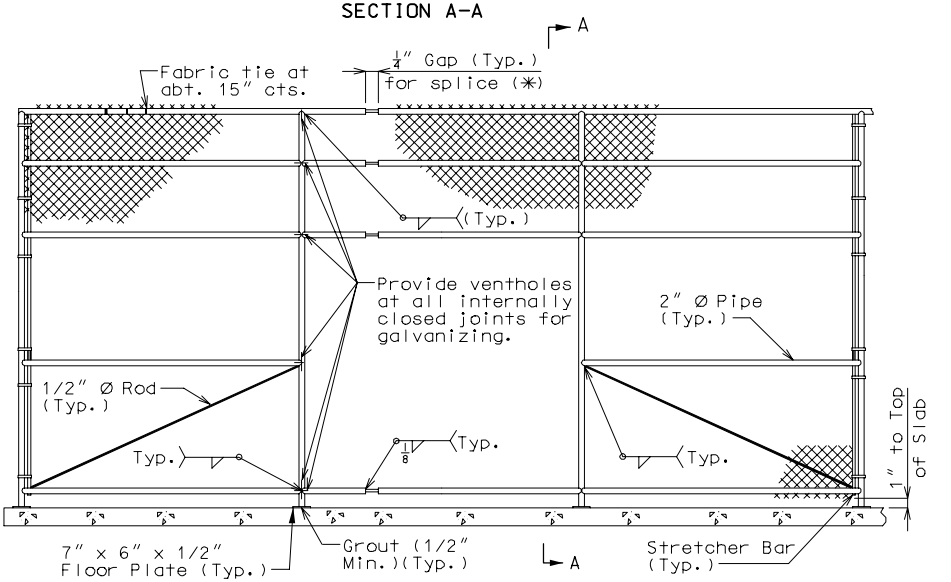
(Add the following notes to the plans.)
The maximum spacing allowed for the braced panels (pull posts) is 100 ft.
Connect the lower end of 1/2" Ø rod to the end of braced panel to which the stretcher bar is attached.

(112″) CURVED TOP PEDESTRIAN FENCE (STRUCTURES) **Chain Link Fence**

(OPTIONAL FENCE DETAIL WHEN REQUESTED BY DISTRICT OR RAILROAD PERSONNEL)



SECTION A-A

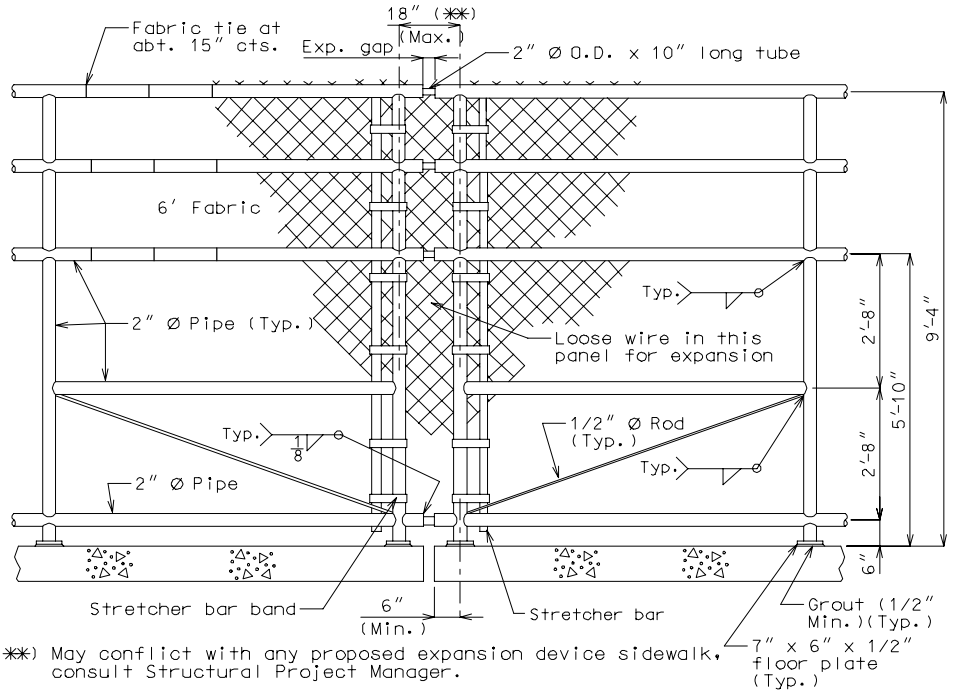


CURVED TOP PEDESTRIAN CHAIN LINK FENCE
(GALV. STEEL) ON SIDEWALK

NOTE: 8′-0″ Max. post spacing for superstructure.
(✳) Locate at about 30′-0″ centers with at least one splice gap between pull posts.

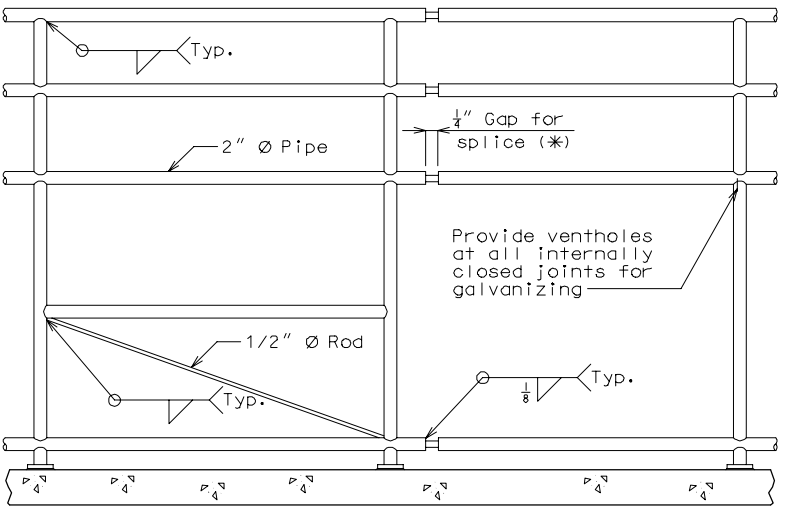
The maximum spacing allowed for the braced panels (pull post) is 100 feet. Connect the lower end of 1/2″ Ø rod to the end of braced panel to which the stretcher bar is attached.

(112") CURVED TOP PEDESTRIAN FENCE (STRUCTURES) (CONT.) **Chain Link Fence**



(✱✱) May conflict with any proposed expansion device sidewalk, consult Structural Project Manager.

DETAILS AT EXPANSION DEVICE GAP



TYPICAL SECTION NEAR SPLICE GAP

Note: 8'-0" max. post spacing for superstructure.

(✱) Locate at about 30'-0" centers with at least one splice gap between pull posts.